a) selecting an arc length and an inner diameter for the discharge chamber wherein the inner diameter in centimeters is greater than $[(1+P/50)^{1/2}-1]$, where P is the input power in watts, and wherein the ratio of the arc length to the inner diameter is about one;

b) forming the arc tube;

c) operating the arc tube at a predetermined average wall loading to obtain a steady-state thermal condition;

d) measuring a longitudinal surface temperature profile of the discharge chamber to obtain a maximum temperature and minimum temperature;

e) repeating steps b) to d) while incrementally decreasing the inner diameter of the discharge chamber with each iteration until the maximum temperature of the longitudinal surface temperature profile is midway between the ends of the discharge chamber; and

f) repeating steps b) to d) while incrementally varying the electrode insertion length with each iteration until the difference between the minimum temperature and the maximum temperature of the profile is minimized without causing the maximum temperature to exceed about 900°C.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a graphical representation of cold and hot spot temperatures of an operating quartz arc tube of this invention as a function of wall loading.

Fig. 2 is a diagram of a quartz arc tube of this invention.

Fig. 3 is a surface temperature profile of an operating quartz arc tube of this invention.

Fig. 4 is a surface temperature profile of an operating prior art quartz arc tube.

DESCRIPTION OF PREFERRED EMBODIMENTS

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following disclosure and appended claims taken in conjunction with the above-described drawings.

For quartz arc tubes used in metal halide lamps, and in particular low wattage metal halide lamps, we have discovered that a cylindrical discharge chamber having a specific geometry and diameter yields unexpected thermal performance and photometric benefits which allow metal halide lamps to successfully function at high average wall loadings of from about 25 to about 40 W/cm^2 without exceeding the arc chamber's maximum allowed wall temperature of about 900°C. More particularly, the discharge chamber of the quartz arc tube of this invention has substantially the form of a right circular cylinder. After reaching a steady-state thermal condition when operating, the quartz arc tubes of this invention exhibit a substantially symmetric and nearly isothermal longitudinal surface temperature profile as viewed along the axis of the discharge chamber without exceeding the maximum allowed temperature of about 900°C. As defined herein, the longitudinal surface temperature profile is determined along the axis of the